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ABSTRACT

Human Performance Technology (HPT) is a rapidly changing field. Evolving from instructional design (ID), HPT shares many of its concepts and applications but encompasses a wider and different domain, including both training and non-training interventions. HPT shares much common ground with the fields of information science (IS) and organizational development (OD). As a field rooted more in application than in research, HPT would benefit by being proactive in its research agenda, rather than react to external forces. Critical for performance effectiveness are: the demand for information on a just-in-time basis; understanding how humans interact with their peers, their organization or group, and their environment; and well-designed training and job aids. Most performance issues would benefit by being viewed from the "whole" open system approach. Maximized performance occurs where HPT, Information Science (IS), and OD theories converge and overlap. At this point, optimal balance is achieved, as the theories of behavioral science, information science, organizational development, open systems, and performance technology are aligned to foster maximized performance. Also included is an HPT job aid that provides a synopsis of concepts from IS and OD, and their potential applications to HPT. (Contains 22 references.) (Author/SWC)

Theoretical bases for HPT: Something Borrowed, Something New

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Human Performance Technology - HPT - is a rapidly changing field; and the theories that inform ID are insufficient for HPT. As a field currently rooted more in application than in research, HPT would benefit by being proactive in its research agenda, rather than reactive to external forces. This proactivity is best based in grounded theory. A thoughtful and cogent theory-building process is preferable to the current piecemeal approach. We suggest that HPT theory-building is best achieved by examining and thoughtfully incorporating the theories of information science and organization development. This alignment will foster maximized performance. Our mission is to conduct scholarly research in HPT as it plays out in professional practice; a new form of research in the summary is proposed, based on "sophisticated practice." A HPT job aid is included that provides a synopsis of concepts from IS and OD, and their potential applications to HPT.

Human Performance Technology - HPT - is a rapidly changing field. It has evolved from instructional design, so it shares many concepts and applications, but it encompasses a wider and different domain: both training and non-training interventions. It is our position that the theories that inform ID are insufficient for HPT; see also Davies (1995). Currently, HPT has a limited and shaky theoretical basis; there is no predictive theory, for example. HPT continues to change rapidly as its practitioners move from a training perspective/ diagnosis/prescription (based in ID theory) to a performance perspective/diagnosis/prescription (based in no particular body of theory, but rather on the sophisticated practice and common sense of the practitioners).

This concept of sophisticated professional practice leading a field is not new to us. Schon has argued for some time that in many professional fields the most interesting and potentially useful scholarship is resident in the most informed professional practitioners. While accepting this view, we feel that it is not a sufficient state of affairs for advancement of the field, and we propose a type of ecumenical theory discussion in the body of this paper and a new form of research in the summary.

A sound theoretical basis for HPT is crucial for several different reasons. First, corporations - the main employers of HPT practitioners - are in a massive restructuring process, as a reaction to the changing business environment. HPT must change to support business (Professional Concerns Committee Report, 1993; Mirvis, 1993). To best do so, HPT should have a well-defined orientation and perspective. Second, the HPT field, in order to continue educating the next generation of professionals, should have a common ground that unifies all the diverse subspecialties - for example, incentive systems to work place design (Gayeski, 1995). Finally, HPT, as a field currently rooted more in application than in research, would benefit by being proactive in its research agenda, rather than reactive to external forces. This proactivity is best based in grounded theory. A thoughtful and cogent theory-building process is preferable to the current piecemeal approach.

Interdisciplinarity and Convergence

If HPT needs theory, where should we look for one? A possible solution is to incorporate - or at least examine - the theoretical bases of related disciplines. Reality is all of one piece; disciplines continually extend and merge into each other (Newell, 1983). The "reality" of organizational performance is examined from the perspectives of many different fields, such as finance, marketing, and management. We see the following instance of contrasting pertinent theory as one of several possibilities. We hope we will convince our colleagues to consider other such efforts to construct a more solid scaffold of relevant theory from adjunct fields.

Two of these fields, information science (IS), and organizational development (OD) are especially pertinent to HPT. First, both IS and OD share much common ground with HPT in terms of contributing fields (Gayeski,

1995; Jacobs, 1988; Foshay, 1992; Shrock, 1995, Goffman, 1970). See Figure 1 below. This common ground makes IS and OD a natural choice. All three fields have the same overall structured approach in applications: diagnosis, intervention, and evaluation. Second, IS and OD complement each other in what they can contribute to HPT. IS is focused on information identification, storage, and transmission, and information's connection to both communication and computers. This technological orientation is complemented by OD's focus on people in organizations - how they network and cooperate to get the job done.

All three fields also have expanding domains of action within the organizational arena. Some aspects of current organizational life, which affect or are affected by the disciplines of HPT, OD, and IS are:

- Compatibility between work objective and work design
- Information flow between workers and management
- Appropriate work authority
- Flexible, multifunctional workers
- Congruence of reward systems to work design
- More effective and efficient performance

Figure 1. Comparison of Contributing Fields: IS, HPT, and OD

Information Science	*Human Performance Technology*	*Organizational Development*
Anthropology	Behavioral Psychology	Anthropology
Cognitive Psychology	Cognitive Psychology	**Communications**
Communications	**Communications**	Industrial Engineering
Computer Science	Computer Science	Industrial Psychology
Human-Computer Interaction	Education	Management
Linguistics	Instructional Design	Organizational Psychology
Management	**Sociology**	**Sociology**
Semiotics	**Systems Theory**	**Systems Theory**
Sociology		
Systems Theory		

This figure does NOT show all the contributing fields; it illustrates the diverse range of contributing fields. The contributing fields that IS, HPT, and OD have in common are shown in bold.

Figure 2. Comparison of EPSS Functions and IS Cognitive Artifacts

EPSS Functions	*IS Cognitive Artifacts*
Job Aid	On-line Help
Expert System	Decision Support System
Storage of Records	Database

This figure does NOT show all EPSS functions; only a few are listed to show the similarities.

This expansion has resulted in a convergence of focus (some would say a collision) and parallel development, with both benefits and drawbacks for HPT professionals. A point of convergence between OD and IS is in HPT's Electronic Performance Support Systems. Figure 2 compares several EPSS functions and their IS counterparts; the terms are different, but the intended functions are becoming virtually identical.

General Systems Theory and the Social Sciences

The general systems theory is the father of many contemporary social science theories. It was developed by von Bertalanffy in the 1920s, although it did not become popularized until the 1940s (von Betalanffy, 1968). Von Bertalanffy originally envisioned it to be applied to the physical sciences, but later it found wide and fruitful applications in the social sciences - including the study of organizations (Katz & Kahn, 1966). Von Bertalanffy wanted the general systems theory to "unify the sciences and develop the generalized ears ... to overcome the deafness of specialization." (Blauberg, Sadovsky, and Yudin, 1977, p 63). General systems theory contributes to HPT, information science, and organizational development.

As most of our readers know, organizations are "systems" composed of interacting elements. These elements can be at different levels of complexity, forming a hierarchy of systems. For example, employees in a manufacturing department are elements in the manufacturing system; the manufacturing department is an element in the organizational system, as are the marketing department and human resources; and the organization itself is an element in it's field of industry. The elements interact with each other and with their environment because the system is open to its environment. There are inputs, throughputs, and outputs. Finally, the elements and the systems are dynamic, always changing over time.

The general systems theory found wide acceptance in the social sciences, with each area of study adapting the theory to its own unique situation and needs. Although it may not be apparent now, HPT, IS, and OD all have a firm basis in the general systems theory (Cherns, 1987; Geis, 1986; Jacobs, 1988; Mesarovic, 1983; Rummler & Brache, 1988). This common basis makes theory borrowing tempting and easy - perhaps inevitable.

General Systems Theory and HPT

HPT goes beyond training and job aids, in terms of legitimate scope of interventions, to examine the other factors affecting individual and organizational performance. These other factors may be anything from the tools and incentives (Gilbert, 1978) on the individual level, to the allocation of resources on an organizational level. Rummler and Brache (1988) write that the individual is in a "loop of inputs, outputs, consequences, and feedback..."(p 46) and that there are three levels of performance:

1. Organizational level
2. Process level
3. Individual job level

Information Science

Information science is an interdisciplinary field with diverse contributing fields: general systems theory, management science, games theory, cognitive science, computer science, semiotics, cognitive psychology, sociology, and communications, to name some, but not all. Some of the same scholars, such as Saracevic and Mesarovic, who were instrumental in bringing attention to systems theory were also important contributors to the information science field.

Information science activities are all based in the various phases of the "information life cycle." If one thinks of information as dynamic, changing over time - and also growing old - then the life cycle phases, and their pertinence to organizations, become clearer. The information life cycle phases are:

- Identification of information
- Capture
- Codification
- Storage
- Maintenance (including additions and changes)
- Disposal

IS emerged as a distinct area of research and application during and immediately after World War II (very similar to instructional design, isn't it?). With the advent of modern computer technology, it has become firmly based in and concerned with issues of electronic storage and communication.

IS Trends, Boundaries, and Approach

IS has traditionally focused on quantity of information processed, not quality of information (Haney, 1996). In the last ten years, information science scholars and practitioners have shown an increasing concern with the larger context in which information technology operates. This is a trend away from data and towards knowledge and applications as IS expands its domain.

Three branches of information science that support organizational performance are:

1. *Information technology (IT)*: the study of information storage and communication devices, especially computer and electronic applications.
2. *Information systems:* the study of operations and procedures focused on information.
3. *Information management:* the study of information to support decision making.

The design of card catalogues is a typical example of IS approach. For example, 30 years ago, paper card catalogues in libraries were universal; now almost all library catalogues are electronic. The organizing issues about the catalogues (How should this information be presented? In what way will patrons try to use this? How should it be best accessed? What level of detail should be given on an individual entry? etc.) are typical IS concerns, and have not changed, even though the physical artifacts have been transformed.

Information Science Applications to HPT

One of the most immediately usable concepts for HPT that IS offers is that of the information life cycle. The idea that information has a "shelf life," and eventually will have to be updated or replaced, provides a new perspective on HPT interventions. It stimulates questioning as to where, how, and for how long the intervention fits into the organization in a beneficial way. More detailed potential applications of the information life cycle to HPT is given in the HPT Performance Tool, which follows this paper.

Organization Development Components, Trends, and Boundaries

Because work is done in organizations, it is imperative that we understand how organizations, as social systems, impact individual, group, and organizational work performance (Hackman & Oldham, 1980). Cummings and Worley (1993) describe organization development as "... a process by which behavioral science knowledge and practice are used to help organizations achieve greater effectiveness, including improved quality of life, increased productivity, and improved product and service quality. Moreover, OD is oriented to improving the total system ..." (p 1). They define OD as "...a system wide application of behavioral science knowledge to the planned development and reinforcement of organizational strategies, structure, and processes for improving an organization's effectiveness." (p 2).

This concept of OD emphasizes several components that differentiate OD from other approaches to organizational change and performance improvement (Cummings and Worley, 1993). For example:

- OD applies to the entire system, i.e., company, plant, department or work group, as opposed to only a few aspects of the system, such as MIS or individual training.
- OD is based on behavioral science micro concepts, such as leadership and work design, as well as macro concepts such as organization strategy and environmental relations. This is in contrast to approaches which only emphasize training, operations management and engineering, which typically neglect the personal and social needs of the organization and its members.
- OD, while concerned with planned change, is not applied in the rigid sense that is normally associated with business planning. OD is more of an adaptive process for planning and change rather than a blue print or fixed rules for what must be done.
- OD involves both the creation and subsequent reinforcement of change. It moves from attention to implementing change to stabilizing or institutionalizing new behaviors, processes, and activities within organizations.
- OD encompasses strategy, structure, and process changes, though some approaches focus on one type of change. For example, a change process aimed at developing a new strategy might focus on environmental relationships, changes in how people are grouped to perform tasks (structure), or problem solving strategies (process).
- OD is oriented to improve organization effectiveness by first, providing a way for organizations to be able to solve their own problems without the help of outside influences and consultants, and secondly, by helping organizations realize that to be effective the organization has to have both high quality of work life (QWL) and high productivity.

Organization change is a broad phenomenon involving a diversity of applications and approaches which include economic, political, technical, and social perspectives. OD and HPT are not mutually exclusive. We agree with Foshay and Moller (1992) that OD is a contributing field to HPT, but we go even further in thinking that OD should become more widely incorporated in HPT practices. If properly understood and attended to, OD can provide the structure and process requirements to improve HPT interventions at the individual, group, plant, and/or organization level.

OD History

OD has emerged from five major backgrounds or stems (Cummings and Worley, 1993) beginning in the 1940s with the growth of the National Training Laboratories (NTL) and the development of training groups, better know today as sensitivity groups or T-groups. The second contribution to the field came from the early work in the mid-1940s in survey, research, and feedback by Lewin at MIT. Upon Lewin's death in 1947 his staff moved to the University of Michigan and continued working under Rensis Likert at the Institute for Social Research. Another contributing factor also took place in the 1940s, which was the classic research performed by Collier, Lewin, and Whyte on applying research to managing change. In the 1950s the fourth major contribution came about with the focusing on QWL and productivity research by Erik Trist and his colleagues at the Tavistock Institute in London, England. Finally, the most recent influence came about in the 1960s through Richard Beckhard's open systems work creating strategic change and organization transformation.

OD continues to integrate new perspectives, such as strategy, technological change, and total quality management. New techniques are continually added to the sophisticated practice of OD because practitioners have found that one OD intervention may work in one company or country, but not in another. In our opinion this addition of techniques parallels the practice of HPT, and the realization by the fields and the practitioners that every intervention, to be most effective, does not necessarily have to be a training intervention, a data base design intervention, or a team building intervention. It is this recognition and the ability of the sophisticated practitioner to utilize the "correct" intervention to improve effectiveness that will become the cornerstone of maximized performance.

In the field of OD, professional associations have grown from a few people in the initial beginnings of the OD Network in 1964 to several thousand members today, and additional organizations, such as ASTD and the Academy of Management, have established OD divisions that have thousands of members. The first master's degree program was established in the early 1970's at Pepperdine University, and the first doctoral program in OD was established at Case Western Reserve University (Cummings and Worley, 1993).

Some noteworthy people that have had an influence on and contributed to the field of OD are: Chris Argyis, who developed a learning and action-science approach to OD; Edgar Schein, who tied the key role of culture to change management; Edward Lawler III, who extended rewards and employee involvement to OD; and others, such as Peter Block and Thomas Cummings.

OD efforts have taken place in corporations, schools, governments, and the military. While many organizations, both within the United States and internationally, apply OD approaches and techniques (without knowing the term exists), few have formal OD programs in place.

OD Theories and Interventions

OD is directed at bringing about planned change within organizations. Within this paper we present three theories of planned change, one typical OD model of practice, and one intervention system based upon open systems theory.

We understand that most readers will be familiar with these theories. We hope the juxtaposition of the theories will provide a fresh perspective, a synergy, that provides new concepts at the theoretical level and new possibilities for professional practice.

The planned changed theories to be discussed are Lewin's Change Theory model, the Planning Model developed by Lippit, Watson, and Westley, and the Action Research Model of Planned Change (Cummings and Worley, 1993). The typical practice model presented is a four step model using methods similar to HPT and instructional design models. The intervention system based in open system theory that we present is the socio-technical system intervention.

Planned Change Theories

Lewin's Change Theory of planned change includes three stages that act to modify those forces keeping a system's behavior stable (Cummings and Worley, 1993). The steps in Lewin's theory are:

1. *Unfreezing:* This step involves obtaining information and activities that help determine the gap between where an organization desires to be and where the organization actually is.
2. *Moving:* This second step involves shifting the organization or department to a new level through the development of new behaviors, and values.
3. *Refreezing:* This final step is intended to stabilize the organization at a new state of equilibrium.

Lewin's Change Theory could easily be incorporated into HPT as a guideline for successful performance interventions and initiatives. Many times a training intervention requires unfreezing, moving and refreezing in order to be successful. Too often in the practice of HPT and related fields the practitioner provides the "tools" without facilitating the change in organizational, group, or individual behavior that is important to success. Upon implementing the intervention the sophisticated practitioner, in our opinion, should make an effort to institutionalize the new behaviors that the intervention intended to produce (refreezing).

The Planning Model (developed by Lippit, Watson, and Westley) views planned change primarily from the perspective of working with the organizational members. The two underlying principles associated with this model are:

1. Information must be freely and openly shared between the organization and the change agent.
2. This information must result in some type of action. The model has seven steps: scouting, entry, diagnosis, planning, action, stabilization and evaluation, and termination. The planned change model is compatible with the practice of HPT and provides for a thorough approach to performance. Both HPT and OD practitioners need to have removing themselves from the organization (handing off) as an ultimate goal, so that the organization can maximize performance on its own.

The Action Research Model of Planned Change is a cyclical process in which information obtained in the initial organizational research is used to foster action, and this action is assessed to provide further information for further action, which creates the cycle. Action research traditionally aimed both at helping specific organizations implement planned change, and at developing information to apply in other settings. The Action Research Model of Planned Change has eight steps: problem identification; consulting with behavioral science expert; data gathering and preliminary diagnosis; feedback to key client or group; joint diagnosis of problems; joint action planning; action; and data gathering after action. The Action Research approach is worthy of consideration by sophisticated HPT practitioners. The joint diagnosing and planning, and identification of new problems that occur as a result of the intervention are closely related to the Rapid Collaborative Prototyping Model proposed by Dorsey, Goodrum, and Schwen (1995). From an OD perspective it makes sense to include the client in the process of evaluation and planning; this is suggested in the guidelines of the Action Research model.

A Typical OD Model of Practice

In the practice of OD, one typical approach includes the use of a four step model, similar to HPT and instructional design models. This typical OD approach has four steps: diagnosis, development, implementation, and evaluation. This approach has elements of Lewin's change model, the planned change model, and the action research model. While this four step model is easy to remember, it is limited by not focusing on Lewin's unfreezing and refreezing components, and also by not including the joint diagnosis, planning, and cyclical components found in the action research model for planned change.

The Socio-Technical Systems Theory

OD assesses an organization's relationship with its external and internal environments. OD also draws from the behavioral sciences when it focuses on the individual and group dynamic processes that are essential to organizational change and effectiveness. One such intervention system that is based in open system and behavioral science theories is the socio-technical system intervention. This theory is based on the observation that an organization has both a social aspect composed of people in a social network and a technical aspect composed of tools, equipment, and procedures (Schwen, Goodrum, & Dorsey, 1993). "Socio-technical theory is grounded on two fundamental premises: (1) that the production of a good or service requires the joint optimization of two independent, yet correlative systems – a social and a technical system; (2) that the social–plus–technical system must relate to its environment if it is to function and develop." (Cummings and Srivastva, 1977, p 49). The social component of the system includes the social growth and personal interaction needs of the individuals, groups, and organization.

In order to relate a system to its environment, it is necessary to define the system in a way that differentiates it from its environment, and in a way that denotes that the system is relatively open to its environment. The environment provides inputs that the systems use as through-puts which return to the environment as outputs to be used to provide more inputs to the system. For example, raw materials (inputs) become in-process materials (throughputs) which in turn become finished goods (outputs).

Open systems are hierarchically ordered in that each higher level system is composed of the lower systems. From the socio-technical systems perspective, the hierarchy from lower to higher ordered systems is composed of the individual, group, and organization (Cummings and Srivastva, 1977).

Socio-Technical System Design Guidelines

Using the conceptual underpinnings of socio-technical and open systems discussed above, the following guidelines for designing work have been developed by socio-technical practitioners (Cummings and Worley, 1993):

- *Compatibility:* designed work should fit the values and objectives underlying the approach.
- *Minimal Critical Specifications:* only critical features needed to implement the work should be specified.
- *Variance Control:* control technical variance.
- *Boundary Location:* organizational boundaries should be recognized to facilitate performance.
- *Information Flow:* timely information is essential to control variances and perform tasks.
- *Power and Authority:* access to resources and authority to command the resources to perform the work.
- *Multi-functional Workers:* personnel should be cross-trained.
- *Support Congruence:* systems supporting work design within socio-technical interventions should reinforce the nature of the design.
- *Transitional Organizations:* a transition plan and system needs to be in place.
- *Incompletion:* continual reassessment and change within the system.

Finally, one socio-technical system approach is associated with self regulating work groups, which are groups composed of members performing inter-related tasks. These self-regulating work groups provide the members with the skills, autonomy, and information necessary to control their own work with little interference from the external environment. "Many organization development practitioners argue that self-regulatory work groups represent the work of the 1990s." (Cummings and Worley, 1993, p 371).

We think that socio-technical system interventions can help the HPT practitioner focus on macro organization perspectives, such as how the organization interacts with the governmental laws and regulations, instead of the tendency to focus on the micro organization perspectives, such as training a dock worker in how to use a fork lift. In fact, looking at performance from a socio-technical perspective increases the likelihood that the proposed HPT intervention will address the performance problems or issues from a total organizational and open system point of view. This means that the micro level intervention will become part of the system approach to organizations

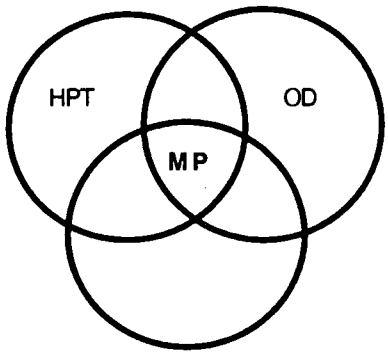
maximizing effectiveness and therefore, maximizing performance. This systems approach to HPT also assists in the design, development, implementation, evaluation, and institutionalization of the performance intervention.

Summary

Three different fields, yet so much in common. In our opinion, HPT practice should include the strengths of related fields. The demand for information on a just-in-time basis is critical to effective performance. Understanding how humans interact with their peers, their organization or group, and their environment is another critical performance factor. Well designed training and job aids are critical for performance effectiveness. Most performance issues would benefit by being viewed from the "whole" open system approach. While some interventions may require training one individual to improve performance, how well this individual fits within the system becomes important to the effectiveness of the overall group and perhaps even the organization.

We believe that Maximized Performance (MP) occurs where HPT, IS, and OD theories converge and overlap. See Figure 3 below. It is at this point that optimal balance is achieved because the theories of behavioral science, information science, organization development, open systems and performance technology are aligned together to foster maximized performance.

Figure 3



HPT Research and the Indiana Performance Group

The Indiana Performance Group (IPG) was recently formed. To address the dilemma of the best scholarship in our field being rooted in advanced professional practice, our mission is to conduct scholarly research in HPT as it plays out in professional practice. We look forward to working with internal and external consultants; using both primary and secondary research methods; and emphasizing measurement. We will attempt to "capture" sophisticated practice by reviewing case studies, original documents, and interventions. We believe that, if we can assure proprietary rights, the careful and disciplined showing of advanced professional practice will move theory in new and unexpected directions. The IPG will use the information collected to inductively discover patterns of sophisticated practice. We ask that any readers willing to share their insights on theory and/or practice contact the Indiana Performance Group

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HPT Performance Tool

Note: this performance tool for human performance technology practitioners is organized as follows: first, it presents the main components of theories and models from information science and organizational development. Next, it presents the potential applications to HPT of those theories and models. Last, it gives space for the reader to write in personal applications. We hope that this "job aid" will benefit our HPT colleagues by suggesting some new ideas and approaches to the situations they encounter at work.

Idea Synopsis	Potential Applications to HPT	Personal Applications
The Information Life Cycle		
1. Identification of information important enough to be saved.	• Front End Analysis: the preliminary investigation. Addressing the issues of what the situation is, what type of intervention will be appropriate, who are the subject matter experts, and what is the best way to obtain the resources necessary to the project.	
2. Capture of information.		
3. Codification of information in a form that will be secure and appropriately accessible.	• Intervention design. Addressing the issues of intervention format and presentation, including incorporation of the organization's culture.	
4. Storage of that information.	• The intervention implementation.	
5. Maintenance of the information. This includes additions, changes, and deletions.	• Organizational responsibility for the project after hand-off. Addresses questions such as: Who shall be responsible for maintenance of the HPT intervention? Is the person committed and empowered (in other words, does the person have both the responsibility and the authority)?	
6. Disposal	• Disposal decisions. Addressing the issues of disposal responsibility and criteria.	
OD Interventions		
The following are client groupings that may require an OD intervention to improve effectiveness:	The following are examples of OD interventions for each client group that apply to improving performance:	
1. Individuals	• Role expectation and clarification • T-groups	
2. Within Teams/Groups	• Team building • Role expectation and clarification	
3. Between Groups	• Survey feedback • Interviews or questionnaires	
4. Total Organization	• Strategic planning activities • Team building at all levels	
Idea Synopsis	**Potential Applications to HPT**	**Personal Applications**

Lewin's Change Theory This theory provides a model for unfreezing, moving, and refreezing the behavior of the individual, group, or organization in order to facilitate implementing and sustaining change within the organization.	1. Identifying and reducing resistance 2. Framework for understanding organizational change 3. Improving the effectiveness of the individual 4. Improving team effectiveness 5. Developing safety and trust within organizations and between groups 6. Developing and implementing new reward systems	
Action Research Model of Planned Change This model of planned change has three distinguishing characteristics: • Consultation with a behavioral scientist • Joint diagnosis and action planning between the consultant and the client • Cyclical in nature	1. Restructuring an organization due to new or changing governmental regulations 2. Reengineering at the organization, division, SBU, plant, and/or group level 3. Organizational mergers 4. Integrating training, HR, and strategic planning into one unit 5. Start-up a new division of an organization 6. Developing and implementing new reward systems 7. Determining production training requirements within a plant 8. Integrating with strategic management	
Socio-Technical Systems Interventions Two important characteristics of socio-technical interventions are: • An organization has both a social and technical system in place that need to be attended to for maximized performance • Organizations interact with their internal and external environments	1. Identifying the need for teams (and the type of team, if any) for new manufacturing techniques 2. Developing training requirements for people whom are not team oriented 3. Improving individual effectiveness 4. Improving team effectiveness 5. Developing training and strategies for a new product introduction 6. Developing and implementing new reward systems 7. Strategic management	

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